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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/651,880	08/30/2000	Stephen Marschner	MSI-546US	1905

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- EXAMINER

SEALEY, LANCE W

ART UNIT	PAPER NUMBER
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2671

DATE MAILED: 06/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/651,880

Applicant(s)

MARSCHNER ET AL.

Examiner

Lance W. Sealey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 10 and 19-63 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-5, 10, 19-45 and 52-63 is/are allowed.
- 6) ☒ Claim(s) 46-51 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Allowed Subject Matter

1. Claims 1-5 and 10 are allowed because no prior art anticipates or suggests a facial expression transformation method comprising defining a code book containing data defining a first set of facial expressions, providing data defining a second set of facial expressions, the second set of facial expressions providing a training set of expressions of a second person who is different from the first person; and deriving a transformation function from the training set of expressions and corresponding expressions from the first set of expressions (claim 1). Claims 19-28 are allowed because no prior art anticipates or suggests operating on a training set of expressions from one person and corresponding expressions from a code book of another person to compute a linear transformation function from the training set and their corresponding expressions (claims 19 and 24). Claims 29-45 and 52-63 are allowed because no prior art anticipates or suggests, in a facial expression transformation system, a second code book in addition to a first code book and a training system of expressions (claim 29). Nor does any prior art anticipate or suggest, in a facial expression transformation method, computing a set of linear predictors a_j , one for each coordinate of g_a , given a set of n expression vectors for a face to be transformed, $g_{a1...n}$, and a corresponding set of vectors for a target face, $g_{b1...n}$, by solving $3m$ linear least square systems of the form $a_j \cdot g_{ai} = g_{bi}[j], i=1...n$, wherein said computing comprises using only a subset of points for each g_{aj} . (claim 52), controlling the spread of singular values

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when computing a pseudoinverse to solve for the a_j (claim 54), projecting a pattern onto a face for the purpose of ascertaining structure data (claim 56), capturing both specularly-suppressed reflection data and structure data from the simultaneous illumination of a second person's face with one light source that is polarized and one structured light source that projects a pattern onto the face (claim 57), and processing surface normals and image data to derive an albedo map in the process of providing data defining a second set of facial expressions (claim 61). Claims 2-5 and 10 are allowed because they depend on claim 1. Claims 20-23 are allowed because they depend on claim 19. Claims 25-27 are allowed because they depend on claim 24. Claims 30-45 are allowed, and claims 53, 55, 58-60 and 62-63 are allowable, because they depend on claims 29, 52, 54, 57 and 61, respectively.

Claim Rejections – 35 U.S.C. 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

3. Claims 46-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Georgiev in view of Parke et al., Computer Facial Animation ("Parke").

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4. With respect to claim 46, Parke discloses a method of animating facial features comprising defining a subdivision surface that approximates geometry of a plurality of different faces ("Variable Topology", pp.95-96).

5. However, Parke does not disclose fitting the same subdivision surface for only one expression to each of the plurality of faces to establish a correspondence between faces and using the correspondence between the faces to transform an expression of one face into an expression of another face. These elements are disclosed by Georgiev at col.4, ll.47-61. The "subdivision surface" is the change vector in l.55. The "only one expression" is the smiling face 302, FIG.6. The "correspondence between the faces" results in the "transport" of a facial expression from one image (the smiling face 302) to another (the new face 304)--see col.4, ll.53-58. Finally, the same subdivision surface can be applied to a plurality of expressions ("The change vector 301 may be applied to any other images.", col.4, ll.60-61)).

6. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate the Parke approximation of facial geometry into the Georgiev method of morphing. This would increase flexibility in animation because new faces could be produced from old ones that are not of the same shape (topology). Parke, p.95, "Variable Topology", first sentence.

7. The other claims in this rejection will now be considered. With respect to claim 47, Parke discloses:

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- measuring 3-dimensional data for a plurality of different faces to provide corresponding face models (Section 3.4, p.66, first sentence of first paragraph and first bullet); and
- defining only one generic face model that is to be used to map to each corresponding face model (p.94, section marked “Fixed Topology”, fifth sentence on p.95).

However, Parke does not disclose the other elements of claim 47. These elements are disclosed by Georgiev:

- selecting a plurality of points on the generic face model that are to be mapped directly to corresponding points on each of the corresponding face models (col.4, ll.11-29; all points are automatically selected on the generic face model to be mapped directly to corresponding points on each of the corresponding face models via the change vector).
- fitting the generic face model to each of the corresponding face models, said fitting comprising mapping each of the selected points directly to the corresponding points on each of the corresponding face models (col.4, ll.60-61).

8. Therefore, it would have been obvious to someone skilled in the art at the time the invention was made to have combined Parke with Georgiev in order to fit the generic face model to each of the corresponding face models. This provides the flexibility of depicting degrees of facial changes (Georgiev, col.4, ll.58-65).

9. Georgiev does not disclose any of the elements of claim 48. However, Parke discloses defining a subdivision surface from a base mesh structure, the subdivision surface containing a

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plurality of vertices and approximating the geometry of the face models (p.95, Figure 3.17 and first full paragraph); and manipulating only the positions of the vertices of the subdivision surface (p.94, section marked "Fixed Topology", next to the last sentence).

10. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate the Parke approximation of facial geometry into the Georgiev method of morphing. This would increase flexibility in animation because new faces could be produced from old ones that are not of the same shape (topology). Parke, p.95, "Variable Topology", first sentence.

11. Georgiev does not disclose the elements of claims 49 and 50. However, Parke discloses manipulating a base mesh that defines a subdivision surface without altering the connectivity of the base mesh (p.94, section marked "Fixed Topology", next to the last sentence).

12. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate the Parke approximation of facial geometry into the Georgiev method of morphing. This would increase flexibility in animation because new faces could be produced from old ones that are not of the same shape (topology). Parke, p.95, "Variable Topology", first sentence.

13. Finally, Georgiev does not disclose the elements of claim 51. However, Parke discloses using a laser range scan to measure the 3-dimensional data at p.78, Section 3.7, first two sentences.

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14. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate the Parke use of a laser range scan into the Georgiev method of morphing. This would increase control in animation because laser range scanning allows sections of faces to be identified by coordinates for easier access (Parke, Section 3.7, p.78, second paragraph, last sentence).

15. Therefore, in view of the foregoing, claims 46-51 are rejected as being unpatentable under 35 U.S.C. 103 by Parke and Georgiev.

Response to Remarks

16. The Office is persuaded by the Applicants' arguments for claims 1, 19 and 24. However, with respect to claims 46-51, as shown in items 4-6 above, Georgiev discloses all the claim elements even considering the Applicants' amendments and what is recited at p.27, l.9 to p.28, l.10 of the specification.

17. With respect to the Applicants' newest "petition" in their latest response for the acceptance of color drawings, a petition separate from the response must be filed for acceptance of the color drawings as formal drawings under 37 CFR 1.84(a)(2) or (b)(1) accompanied by the appropriate fee set forth in 37 CFR 1.17(i). See MPEP 608.02.

18. Therefore, since the rejection has not been changed for the claims that were amended, **THIS ACTION IS MADE FINAL.** See MPEP 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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19. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the Office should be directed to the examiner, Lance Sealey, whose telephone number is (703) 305-0026. He can be reached from 7:00 am-3:30 pm EDT Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reached at (703) 305-9798.

Any response to this action should be mailed to:

MS AF

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450


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or faxed to:

(703) 872-9306

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive,
Arlington, VA, Sixth Floor (Receptionist).

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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